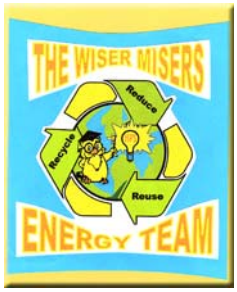
ENERGY ANGLES

TENNESSEE ENERGY EDUCATION NETWORK
ENERGY DIVISION--DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT

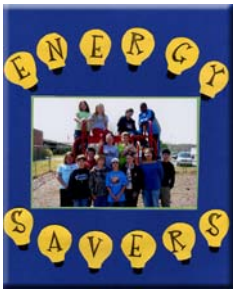
May - June, 2006

Tennessee's 2006 NEED Competition Participants

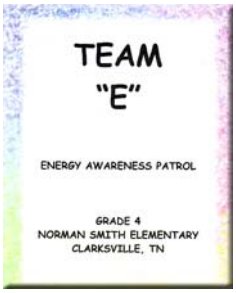
The 2006 National Energy Education Development (NEED) projects represented a lot of hard work on the part of teachers and students in fifteen projects throughout the state. The teams conducted projects to educate their peers and members of their communities about energy efficiency and energy conservation. The state winners' projects were sent to NEED for the national competition. The participants in the state competition were as follows (state & national level winners are noted):



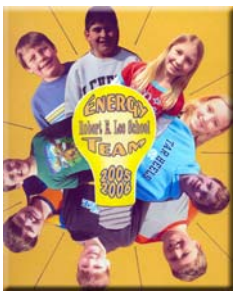
National & State Primary School of the Year
Huntingdon Primary School - Huntingdon
Project Advisor: Connie Bond
Student Director: Justin Malone
Project Title: *Renewables are a Natural Choice*
Project Goals: Educate our Wiser Miser team about energy sources. Help students develop a knowledge of renewable energy sources, conservation, and recycling. Conduct demonstrations to teach the community about energy conservation. Gain leadership by helping those less fortunate in the community through science projects teaching about energy.



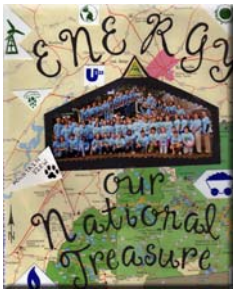
National Elementary Rookie Finialist & 2nd Place State Elementary School of the Year
West Carroll Elementary School - Trezevant
Project Advisor: Jana Vickers
Student Director: Brianna Newsome
Project Title: *Energy Leadership*
Project Goals: Involve students in learning about energy conservation through a recycling program and promote energy awareness in the school and community through various activities and projects.



State Elementary School of the Year
Norman Smith Elementary School - Clarksville
Project Advisor: Kathleen Lange
Student Directors: Maci Belfiore, Kaitlyn Koloski
Project Title: *"E" Team (Energy Awareness Patrol)*
Project Goals: Increase energy awareness within the school and community through classroom presentations, energy contests, and peer teaching.



State Elementary School of the Year
Robert E. Lee Elementary School - Tullahoma
Project Advisors: Kathy Hagler and Sherrie Roberts
Student Directors: Clay Daniel, Sarah Hill
Project Title: *Let's Economize Energy*
Project Goals: Promote energy awareness by presenting experiments, creating exhibits, researching energy topics & writing letters. Educate others about alternative fuels and encourage schools and businesses to use them in the future. Established a paper and cardboard recycling program at our school.



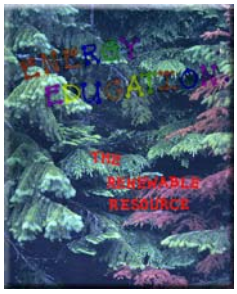
State Junior School of the Year
Mountain View Elementary School - Etowah
Project Advisor: Becky Riley
Student Directors: Matthew Crabtree, Taylor Hafley, Koltin Thompson and Zach Arms
Project Title: *Energy: Our National Treasure*
Project Goals: To educate and inform students, community members, and family members about the current energy issues and map out appropriate actions to resolve them.

The following five winning schools also received a $1500 Energy Star Grant. The grant will be used to purchase Energy Star labeled products for the classrooms.

Huntingdon Primary School
Robert E. Lee Elementary School
Norman Smith Elementary School
Mountain View Elementary School
West Carroll Elementary School

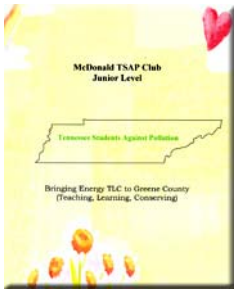
2nd Place State Primary School of the Year & Rookie

West Carroll Elementary School - Trezevant
Project Advisor: Lori McClain
Student Directors: Morgan Lawrence, Bradley McCord, Kody Grass, and Zac Gillian
Project Title: ***R²'s Reaching and Teaching Our Community and School***
Project Goals: Make the school more energy efficient, collect and reduce recyclable items, plant trees, help students learn energy facts in a fun motivational way.



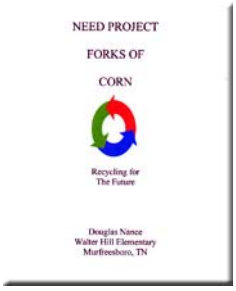
2nd Place State Junior School of the Year

West Carroll Elementary School - Trezevant
Project Advisor: Martha Vann
Student Directors: Candice McGregor, Brooke Tidwell
Project Title: ***Energy Education - The Renewable Resource***
Project Goals: Begin an Energy Education Program at the school using the "Energy Buddy" program, Continue the recycling program, and educate the community by having an Energy Fair.



3rd Place State Junior Level School of the Year

McDonald School - Mohawk
Project Advisor: Pat Carpenter
Student Directors: Sydney O'Brien, Brianne Miller
Project Title: ***Bring Energy TLC (Teaching, Learning, Conserving) to Greene County***
Project Goals: Teach students and community about energy, energy conservation, benefits of saving energy and recycling.

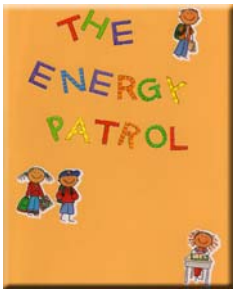


Honorable Mention - Elementary Level

Walter Hill Elementary School - Murfreesboro
Project Advisor: Douglas N. Nance
Student Directors: Amy Hastings, Brice Cripps, Josh Mitchell, Skylar Young, Tara Boone, and Chelsia Cruz
Project Title: ***Cornstarch Recyclable Forks***
Project Goals: Show how to use biodegradable materials to reduce energy.

Honorable Mention - Elementary Level

Walter Hill Elementary School - Murfreesboro
Project Advisor: Cheryl Cothan
Project Title: ***Reduce-Recycle-Reuse***
Project Goals: Show our students and community that recycling is necessary for our future.



Honorable Mention - Junior Level

Dyersburg Middle School - Dyersburg
Project Advisor: Betsy Jones
Student Directors: Whitney Reynolds, Cole Langford
Project Title: ***The Energy Patrol***
Project Goals: Conduct recycling contests, teach students about energy resources, teach importance of recycling, and place recycling bins around the school to encourage recycling.

Honorable Mention - Junior Level

Dyersburg Middle School - Dyersburg
Project Advisor: Terry Cook
Student Directors: Jon Helton, Alyssa Wells, and Morgan Ferrell
Project Title: ***The Green Berets***
Project Goals: Encourage conserving energy at our school and the importance of recycling at school and at home. Show how recycled materials are used.

Other NEED Participants

Smyrna Primary School - Smyrna
Project Title: Energy is a Valuable Thing!

Walter Hill Elementary School - Murfreesboro
Project Title: Everyone Can Help Keep Our Earth Beautiful

West Elementary School - McMinnville
Project Title: "Playing Around with Energy"

Schools going to Washington, DC

Huntingdon Primary School
Robert E. Lee Elementary School
Norman Smith Elementary School
Mountain View Elementary School
West Carroll Elementary School
West Carroll Elementary School

For more information about how your school can become a NEED school, call the Energy Hotline at 1-800-342-1340.

Check out our latest issue of Energy Angles on our website at:
http://www.state.tn.us/ecd/energy_teen.htm

HOBO for the Summer

What is a HOBO? It's a really easy-to-use data logger that you can use with your energy labs to collect and record and graft temperature, humidity and light intensity data. It is portable, durable, easy, fun and inexpensive. There are over 300 free labs available for all grade levels that can be used to teach concepts, including many energy related, through learning activities and labs or to use for science fair projects. The HOBO company has a plan for teachers to borrow the data logger for two months free. After the two months is over, you can write a lab or activity using the HOBO and it's yours to keep. They are currently offering a special summer loan program so that teachers can use the HOBO while out on vacation to get familiar with it before school begins in the fall. You can also borrow a class set of 8 to use and then return. Every unique lab or activity that you create wins a HOBO. For more information, visit the HOBO website at www.iScienceProject.com or email the HOBO Guy, Rich Marvin at rich@iscienceproject.com Below is a sample activity from the website that uses the HOBO to teach about energy. You can read about how a California teacher used the HOBO with students to cut the school's energy bill by 20% at the following website: http://www.fresnobee.com/lifestyle/story/8869256p-9758595c.html

Heating Up a HOBO

SUBJECT: Physical Science
GRADES: Elementary, Middle, High School
EQUIPMENT: HOBO Type J or Type K Thermocouple (H12-001 or H12-002)
Type J or Type K Thermocouple Probe

Introduction:
The purpose of this activity is to find out how a magnifying glass can be used to focus the sun's rays on a single point, thereby simultaneously heating that point and making it appear larger.

Materials:
Type J or K Thermocouple data logger (H12-001 or H12-002)
Type J or K Thermocouple probe
At least one magnifying glass (preferably a strong one)
Crayon
Styrofoam cup

Hypothesis:
What will happen to a Styrofoam cup when you focus sunlight on a single point for several minutes? How long will it take for this to happen? What will happen to a crayon when you focus the sun's rays on it for a few minutes? What will happen to the HOBO probe? How hot do you think you'll be able to make the HOBO?

Theory:
A magnifying glass is basically just a lens that makes objects up close look larger than they really are. It will in fact produce two separate images: a real image and a virtual image.

The virtual image will appear larger than the actual object. Light rays spread out as they pass through the lens and create the illusion of originating on the same side of the lens as the object. This image will be upright.

The real image is formed as light rays pass through the lens and are focused on the other side. This image will always be inverted and its size depends on the distance from the lens to the object and on the focal length of the lens. The focal length is the distance from the lens to the point where parallel light rays are focused. The image is larger than the actual object if the object is less than two focal lengths away. If the object is more than two focal lengths away, the image will appear smaller than the actual object.

The focal length depends on the curvature of the lens. More curvature means that the magnifying glass will bend the rays inward more and they will meet in closer to the lens. Therefore, the more curvature in the lens, the shorter the focal length and the greater the power of the lens.

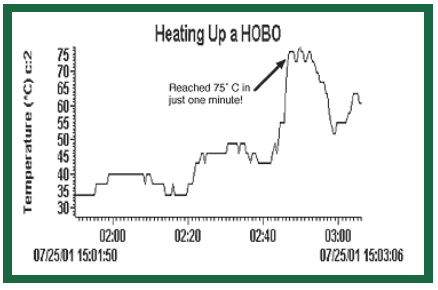
Procedure:
Save this lab for a warm, sunny day. Before going outside, show the students how a magnifying glass works. If you have several, you can pass them around and let the students play with them. While they're occupied, go ahead and launch your Thermocouple HOBO to record at half-second intervals. When you're ready, go outside and find a safe, non-flammable surface (any paved surface would be perfect). Show the students how you can focus the sun's rays into a single point on the Styrofoam cup. Explain that all of the heat contained in those rays is also being focused onto that single point. Ask for a volunteer to do the same thing you're doing, but have him or her focus the light on the Thermocouple probe (this will obviously require that you have two magnifying glasses). Assuming your magnifying glass is strong enough, it should only take a few minutes for the Styrofoam to start melting. With any luck, the students will be amazed.

Now let one of the students try focusing the light on a crayon (someone else should be working on the Thermocouple all the while). It should melt. Ask the students why the crayon is melting. What would happen if you focused the sun's rays on a piece of paper? What is it about the Styrofoam and the crayon that make them melt instead of igniting or just getting hotter?

Now ask them how hot they think the HOBO probe can get. Will it melt or burst into flames like the crayon or a piece of paper? Why or why not? Give it an additional five to ten minutes to heat up, letting the students take turns holding the magnifying glass. Make sure the focal point stays in the same place and don't let anyone touch the surface of the probe (it will be really hot). Then go back inside and check the results.

Analysis:
How long did it take you to get the Styrofoam to melt? How long did it take for the crayon to start melting? What happened to the HOBO probe? How hot did it get? What is the general shape of the heating curve? Would it have continued to get hotter if you had given it more time? Can you explain in simple terms how a magnifying glass works?

Take a look at this sample readout. This experiment was done outside the Onset Computer building and the HOBO reached a temperature of 75°C in just one minute. Can you do better than this?



Energy Smart Leaders Complete Their Year

The TEEN 2005-06 Energy Smart Leaders (ESL) are wrapping up their year with the program. It has been a busy year for the ESLs, as they participated in both state and national training conferences, developed energy projects at their schools and completed a NEED project, recruited new NEED teachers, and hosted workshops for teachers in their districts.

During the summer of 2005, the ESL participants chose between attending the National Energy Education Development Program's Teacher Conferences in Alexandria, VA or Las Vegas, NV. They also attended a two day TEEN training conference along with the TEEN Energy Camp participants. The 2005-06 school year was full of energy education activities and the final project was the submission of their NEED scrapbooks in April. The ESLs have demonstrated excellence in the area of energy education and have made major contributions to their schools and communities by promoting energy conservation awareness.

Completing the 2005-06 ESL program are: Connie Bond, Huntingdon Primary School in Huntingdon; Pat Carpenter, McDonald School in Mohawk; Kathy Hagler, Robert E. Lee in Tullahoma; Janice Marcum, West Elementary in McMinnville; Sherrie Roberts, Robert E. Lee in Tullahoma; Mollie Vann, West Carroll Elementary in Trezevant; Jana Vickers, West Carroll Elementary in Trezevant.

To all the ESLs: even though your year is ending, we look forward to working with each of you on future projects. Congratulations and thanks for a job well done!

ENERGY TOUR 2006

Once again, TEEN will be taking a group of 21 teachers on a tour of various energy sites in Tennessee. The tour will begin on June 20 at Oak Ridge and will continue over the following three days. Tour stops include the TVA headquarters and the electric shuttle facility in Chattanooga, Raccoon Mt. reservoir power plant, the coke ovens and coal mining museum in Dunlap, a strip mine that is being reclaimed, a deep mine, the TN Sportsman Wildlife Foundation Environmental Education Lodge which is completely off the grid, the Buffalo Mt. wind power plant, historical tour of Oak Ridge, visit the American Museum of Science and Energy, Norris dam, a ZEB community in Lenoir City, Idleaire energy saving facility for long-distance truckers outside of Knoxville, Museum of Appalachia, and a coal fired power plant. Look for a follow up article in the fall.

TEEN's 16th Annual Awards Luncheon

The TEEN 2006 Award Luncheon was held on May 12 at Mt. Zion Baptist Church, Nashville. Students, teachers, and parents were treated to energy activities before the *Nautical* Luncheon. Following the meal, awards were given to the state and national winners for the NEED projects and the TEEN placemat and bookmark design contests winners.

Seven Energy Smart Leader Teachers were also recognized for their accomplishments during the 2005-06 school year.

Joseph Riley, appointed to the national NEED Staff in Washington, DC for the 2006 Youth Awards Conference, received a Tennessee Youth Achievement Award from the Governor.

Energy Efficiency Improves Air Quality

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energy UPDATE

Compiled by the Tennessee Energy Education Network **May - June 2006**

UPS Expands 'Green Fleet' with 50 Hybrid-Electric Vehicles

UPS has placed an order for 50 new-generation hybrid electric delivery trucks, saying it will acquire a total of 4,100 low-emission conventional vehicles during 2006. The truck bodies will be identical externally to the signature-brown trucks that now comprise the UPS fleet.

The first of the 50 HEVs will be deployed in Dallas this June and will join more than 10,000 low emission and alternative-fuel vehicles already in use. The UPS alternative fuel fleet — at 1,500 vehicles one of the largest in the United States — currently includes trucks powered by compressed natural gas, liquefied natural gas, propane, electricity and hydrogen. The 50 HEV delivery trucks collectively are expected to reduce fuel consumption by roughly 44,000 gallons over the course of a year compared to a normal diesel truck. The hybrids also should reduce by 457 metric tons the amount of CO2 gases released into the atmosphere over the course of a year. The 4,100 low emission vehicles offer a 15 percent improvement in fuel economy over the vehicles that will be retired. These vehicles will save roughly 1.5 million gallons of fuel over the course of a year, emitting 16,000 fewer tons of CO2.

GreenBiz.com
http://www.greenbiz.com/news/news_third.cfm?NewsID=30422

In Norway, Break the Law and Live by a Beach

The Web site reads like an advertisement for a vacation home. "Is Bastoy the place for you?" it asks next to photographs of a sunset sparkling off the tranquil waters of the Oslo fjord and horses pulling sleighs over packed snow. This wooded island could be — if you are a rapist, a murderer, a drug trafficker or have accepted a large bribe.

The minimum security prison on the one-square-mile Bastoy Island in Norway offers its 115 "residents" cross-country skiing, tennis and horse-riding, but before the inmates can head off to practice their serve or hit the beach for a swim, there is work to do on the farm.

According to the governor of the prison,"We want to become the first ecological prison in the world. It's about giving the inmates responsibility (and) trust, and teaching them respect."

Only a handful of cars are used by prison staff on the island and along with the ferry, their engines will be converted to biofuel. The prison's six horses do most of the work, pulling carts driven by the prisoners, waste from the prison is used to generate power while oil heaters are being converted to wood.

James Kilner,
Reuters, March 28, 2006

Philadelphia OKs No-Flush Urinals at Skyscraper after Cutting Deal with Plumbers

Philadelphia city officials recently approved the use of waterless, no-flush urinals at what will be Philadelphia's tallest skyscraper — but only after reaching an agreement with plumbers.

In the deal, the developer agreed to a five-year trial of the 116 urinals. The developer is barred from installing the urinals in any other buildings in Philadelphia during that period, and they will have to be replaced with water-using units if they do not work as billed.

The no-flush units are expected to save at least 1.6 million gallons of water a year. Instead of water, a replaceable cartridge at the base traps odors and sediment as waste passes through. The technology has been in use since the early 1990s

Liberty Property Trust is hoping to claim the honor of America's tallest environmentally friendly building with the construction of the 57-story Comcast Center.

***Deborah Yao**,*
Associated Press
April 06, 2006

Electric Turkey Leftovers

Construction has begun on the first power plant in the U.S. to generate electricity using turkey manure. Located in Benson, Minnesota, Fibrominn will generate 55 megawatts of power using about 700,000 tons of turkey litter and other agricultural waste each year. Fibrominn should be operational in 2007. Locations for additional turkey power plants include Maryland and Mississippi. For more information, visit www.fibrowattusa.com

Short Circuits Energy Exchange, March 2006.

Microbes at the Gas Pump

Scientists searching for an Earth-friendly alternative to gasoline are looking in some of the weirdest places—termite guts, cow stomachs, and rotting logs. These researchers are hunting for bacteria and fungi that can help turn plant waste into ethanol. To produce enough ethanol to meet our energy needs, researchers are developing methods to turn plant parts into ethanol. They're members of a growing movement to use renewable resources, such as plants, to provide energy.

"There's leftover plant material everywhere," says a microbiologist at the California Institute of Technology in Pasadena. "There are rice hulls, sawdust, wood chips—plant material that's full of energy." To tap this energy supply, scientists and engineers are turning to microbes to convert huge amounts of waste plant material into ethanol for cars.

Scientists are looking for these cellulose-busting enzymes in unusual places—termite stomachs, for example. Termites harbor more than 100 species of bacteria in their guts—bacteria that may help us make ethanol from plant waste. These microbes digest cellulose and other complex molecules in wood. Without their bacteria, termites wouldn't be able to survive on their woody diet.

http://www.sciencenewsforkids.org/articles/20060412/Feature1.asp
April 12, 2006

Tiny Reactor Boosts Biodiesel Production

A tiny chemical reactor that can convert vegetable oil directly into biodiesel could help farmers turn some of their crops into homegrown fuel to operate agricultural equipment instead of relying on costly imported oil.

The device — about the size of a credit card — pumps vegetable oil and alcohol through tiny parallel channels, each smaller than a human hair, to convert the oil into biodiesel almost instantly.

By comparison, it takes more than a day to produce biodiesel with current technology.

William McCall, Associated Press, April 20, 2006

Air Force and Whole Foods Top EPA's List of Renewable Energy Users

The 2006 Green Power Top 25 list includes a diverse set of U.S. companies, organizations and government institutions that have voluntarily bought the most renewable energy and are part of the Environmental Protection Agency's (EPA) Green Power Partnership.

The 2006 Top 25 green power purchasers are buying enough energy to power more than 300,000 homes a year, which is also comparable to removing the emissions of nearly 400,000 cars from the road annually.

The U.S. Air Force once again leads the green power Top 25 list, purchasing more than 1 million MWh annually for Air Force bases across the country. The Air Force has held the No. 1 spot since the Top 25 list started in September 2004.

The complete list of Top 25 EPA Green Power Partners is as follows, listed in order of purchase size:

1. U.S. Air Force
2. Whole Foods Market
3. U.S. Environmental Protection Agency
4. Johnson & Johnson
5. U.S Department of Energy
6. Starbucks
7. The World Bank
8. Safeway, Inc.
9. U.S. General Services Administration (Region 2)
10. HSBC North America
11. City of Sand Diego, Calif.
12. New Jersey Consolidated Energy Savings Program
13. Advanced Micro Devices/Austin, Texas Facilities
14. WhiteWave Foods
15. Staples
16. Austin (Texas) Independent School District
17. Mohawk Fine Papers, Inc.
18. The Tower Companies
19. FedEx Kinko's
20. U.S. Army/Fort Carson
21. University of Pennsylvania
22. Montgomery County, Md.
23. Hyatt Regency/Reunion & DFW Airport Hotels
24. Western Washington University
25. Commonwealth of Pennsylvania

John Millet
U.S. Environmental Protection Agency (EPA)
January 25, 2006